

Managing Contaminant Flux with an Engineered In-situ Aerobic Treatment Zone

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An Engineered Aerobic Treatment Zone was constructed to limit contaminant flux in groundwater at site (SWMU 196 at the Charleston Naval Complex) contaminated with chlorobenzene and dichlorobenzenes. The site was originally contaminated with concentrations of dichlorobenzenes as high as 280,000 µg/L, levels that suggested the presence of a DNAPL source.

In Situ Chemical Oxidation (ISCO) using Fenton's Reagent was initially applied at the site as an interim measure to achieve mass reduction and a reduction in plume concentrations. Approximately 113,000 pounds of hydrogen peroxide (50-percent basis) were applied in a three phased injection approach to the shallow aquifer via 18 injection wells. Though initial results showed high levels of dissolved contaminant reduction, contaminant rebound was observed in source wells located near the upgradient source boundary, suggesting the presence of residual source material.

Although ISCO reduced the amount of source contaminant present at the site, the technology was unable to sustain reduced concentrations over a long period of time and achieve the Remedial Action Objective (RAO) of limiting contaminant migration from the site towards an adjacent brackish creek. Therefore, an additional technology was implemented to the treatment-train to achieve the RAO.

An engineered aerobic treatment zone was constructed between the source area and Shipyard Creek to provide contaminant reduction of chlorobenzenes and dichlorobenzenes. Biosparging is the technology being utilized in the aerobic treatment zone. Many of the existing Fenton reagent injectors were converted to use as biosparging points.

By injecting air into the groundwater, oxygen functions as an electron acceptor and facilitates indigenous microorganisms in the mineralization of dichlorobenzenes and chlorobenzene.

This paper will provide a detailed discussion of the construction and operation of the treatment system, as well as the results of its first year of operation pertaining to the ability of the engineered aerobic treatment zone to reduce contaminant flux to Shipyard Creek.